

# JSR

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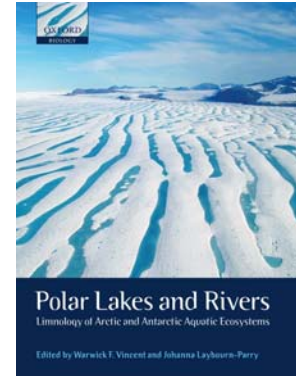
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*Polar Lakes and Rivers—Limnology of Arctic and Antarctic Aquatic Ecosystems*, edited by Warwick F. Vincent & Johanna Laybourn-Parry, 2008. Oxford Biology Collection. Oxford University Press, Great Clarendon Street, Oxford OX2 6DP, GB, [www.oup.com](http://www.oup.com). 320 pages. Paperback, price GBP 37.50, ISBN 978-0-19-921389-4. Hardback, price GBP 70.00, ISBN 978-0-19-921388-7.



The harsh Arctic and Antarctic landscapes are enliven during the polar summer by the appearance of running and stagnating fresh water. This short season witnesses an exceptional activity of water, but liquid water is considerably much more abundant in other parts of the cold environment. The variety of ecosystems in polar lakes and rivers, from wetlands and small creeks on ice-free terrestrial areas to deep down in the subglacial Antarctic reservoirs, is the subject of this book, which is written by outstanding specialists in Arctic and Antarctic research, representing leading institutions from the U.S.A., Canada, the U.K., Denmark, Spain, Iceland, Finland, Sweden, Australia and New Zealand. Although the book is published in the Oxford Biology Collection, the ecological framework requires a broad presentation of issues that are important from the point of view of earth scientists. In this context it must be noted that it is highly unfortunate that there is no “Oxford Earth Science Collection” yet!

Research on lakes and rivers in polar regions is presented in a historical framework in the initial chapter. This includes an overview of the limnological biodiversity in relation to environmental conditions and the influence of the globally changing nature. The next three chapters are devoted to the origin, geomorphology, paleolimnology and physical characteristics of high-latitude lakes. Examples from both the Arctic and the Antarctic are provided, giving insight into both similarities and differences between lake ecosystems in the north and the south, their changes due to hydrological, geological and geomorphological interactions such as water availability, glacier ice and frost occurrence (thermokarst), and land diversification due to glacio-isostatic rebound; these examples are also discussed in the context of processes that are involved in the formation of lakes (tectonics, volcanic activity, meteorite impacts, karst features, etc.) elsewhere in the world.

The sedimentary record forms the basis for the paleolimnological studies that follow. These studies pay due attention to the reconstruction of the natural environment of lakes and their catchment areas, including human impact on biotic and non-biotic elements. Undoubtedly, the research of polar lake deposits, which is carried out ever more frequently with advanced technological methodologies (radiocarbon AMS, short-lived isotopes, OSL dating, etc.) contributes substantially to the understanding of environmental changes, not only in the polar areas, but also in less cold (and even warm) areas. The research concerning the physical properties of high-latitude lake environments (such as underwater radiation, water stratification and mixing, hydrological balance) that are strongly affected by low temperatures and by the occurrence of an ice or snow cover, is equally essential, not only for the understanding of energy

fluxes in polar areas but also for predicting future scenarios of their development and the worldwide impact that these energy fluxes may have.

These paleolimnological studies are followed by the only chapter that is fully devoted to the physical properties of flowing water (in high-latitude rivers and streams, and thus under a restricted number of environmental conditions), especially with regard to their function in shaping landscapes and in their environmental impact on the northern oceanic basin; as the authors stress themselves: “11% of the total fresh-water drains into the Arctic Ocean, that represents only 1% of the total ocean”.

The chapters “Ice-based freshwater ecosystems” and “Antarctic subglacial water: origin, evolution, and ecology” deal with two issues that are specific for the limnology of polar regions. They refer to situations where glacier ice occurs (cryoconites, supraglacial pools and streams, ice-shelf ponds, subglacial lakes and rivers), but also to water bodies on lake-ice. It is questionable whether ponds originating on sea-ice should have been included in the book (they are not), as they form in some cases fresh-water or brackish ecosystems. Recently discovered traces of life in Antarctic subglacial habitats have drawn attention to this environment, resulting in a wide interest for their physical conditions. The biogeochemical processes in high-latitude lakes (carbon and nutrients cycles) discussed in the following chapter, are of great importance, not only for scientific, but also for economic and climate reasons.

Several chapters follow that deal explicitly with biological aspects (phytoplankton, benthic communities, microbes, zooplankton and zoobenthos, fish populations and food-web relationships), and these may be of less interest for the earth-science community. Much more appealing for geoscientists dealing with polar research are, however, the finale two chapters of the book. These provide a wider perspective, including human impact on high-latitude lakes and rivers (both physical impacts and chemical contaminations). There is also a summarizing section about future directions in polar limnology. The latter touches new methods that are developed and that can be used for the polar fresh-water monitoring; models of Arctic and Antarctic aquatic ecosystems are introduced here.

Only a multidisciplinary approach can be fruitful in polar studies. It is therefore fortunate that the growing interest in the role of both biotic and abiotic elements of the polar environment and their interrelations with globally observed changes are well documented. This concerns, among other topics, the various aspects of lake and riverine ecosystem adjustments. The book thus provides a wide scale of illustrations from the Arctic and Antarctic, which will be appealing for both readers with a general interest in environmental studies and scientists working exclusively in this research field. It is the first attempt to concentrate the various problems of polar limnology in one volume. The book forms part of an endorsed project of the International Polar Year (IPY) 2007-2008, and the careful attention paid to such a wide variety of biological and non-biological (with emphasis on earth scientific) topics certainly fulfills the IPY objective of raising awareness and enlarging the knowledge of processes and environmental changes in polar regions.

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